10CV64

USN

Sixth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Geotechnical Engineering – II

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1   a. What are the objectives of soil exploration? With a neat sketch, explain any one method.
                                                                                        (06 Marks)
    b. What are the objectives of dewatering? With a neat sketch, explain any one method.
                                                                                        (06 Marks)
    c. A sampling tube has inner diameter of 70 mm and cutting edge diameter of 68 mm. Their outside diameters are 72 mm and 74 mm respectively. Determine the area ratio, inside clearance and outside clearance of the samples. This tube is pushed to the bottom of the bore hole to a distance of 550 mm with a length of sample recorded being 530 mm. Find the recovery ratio.   **(08 Marks)**

2   a. Distinguish between Boussinesq's and Westergaard's theory of stress distribution. **(06 Marks)**
    b. Explain construction and uses of Newmark's chart.   **(08 Marks)**
    c. A water tank is supported by a ring foundation having outer diameter of 10 m and inner diameter of 7.5 m. The ring foundation transmits a load intensity of 160 kN/m^2. Compute the vertical stress induces at a depth of 4 m below the centre of ring foundation using Boussinesq's analysis.   **(06 Marks)**

3   a. List the characteristics and uses of flow net.   **(06 Marks)**
    b. Explain the graphical method of determining phreatic line in homogenous earth dam with horizontal filter.   **(08 Marks)**
    c. For an earth dam of homogenous section with horizontal filter. The coefficients of permeability in x and y directions are 8×10^{-7} cm/s and 3.6×10^{-7} cm/s respectively. The flow nets constructed include 4 flow channels and 18 potential drops. Determine the discharge through the dam in m^3/day if the treat during seepage was 14 m. **(06 Marks)**

4   a. Distinguish between the active and passive earth pressure.   **(04 Marks)**
    b. With a neat sketch explain the procedure to determine the lateral earth pressure by Culmann's graphical method.   **(08 Marks)**
    c. A retaining wall of 8 m height retains sandy material. The properties of sand are e = 0.6, $\phi = 30°$ and G = 2.65. The water table is at a depth of 2.5 m from the ground surface. Draw the earth pressure diagram and determine the magnitude of total active earth pressure.
                                                                                        (08 Marks)

PART – B

5   a. With neat sketch, explain different types of slope failures.   **(06 Marks)**
    b. Explain Swedish slip circle method for cohesive soils.   **(06 Marks)**
    c. A 5m deep canal has side slopes of 1:1. The properties of soil are $C_u = 20$ kN/m^2, $\phi_u = 10°$, e = 0.8 and G = 2.8. If Taylor's stability number is 0.108, determine the factor of safety with respect to cohesion when canal runs full. Also find the same in case of draw down if Taylor's stability number for this condition is 0.137.   **(08 Marks)**

6 a. Define ultimate bearing capacity, safe bearing capacity and allowable bearing capacity.
        (06 Marks)
   b. With a neat sketch, explain plate load test. **(06 Marks)**
   c. Determine the safe bearing capacity of a square footing with 2.1 m width placed at a depth of 1.5 m in a soil with moist unit weight of 17 kN/m^3, C = 15 kN/m^2 and ϕ = 20°. Take N_C = 11.8, N_q = 3.9 and N_r = 1.7, what is the change in bearing capacity if the water table raises to 0.5 m above the base of footing? Assume factor of safety as 3. **(08 Marks)**

7 a. Explain the terms:
        i)   Immediate settlement
        ii) Primary consolidation settlement
        iii) Secondary consolidation settlement
        iv) Differential settlement **(08 Marks)**
   b. Estimate the immediate settlement of a footing size (2×3) m resting at a depth of 2m in a sandy soil. The compression modulus of soil is 10 N/mm^2. The footing is expected to transmit a unit pressure of 160 kN/m^2. Assume μ = 0.28 and I_f = 1.06. **(06 Marks)**
   c. A square footing of width 1.2 m rests on a saturated clay layer of 4 m deep liquid limit of clay is 30%, unit weight is 17.8 kN/m^2, moisture content is 28% and specific gravity is 2.68. Determine the settlement if the footing carries a load of 300 kN. **(06 Marks)**

8 a. Explain the factors influencing the selection of depth of foundation. **(06 Marks)**
   b. Discuss the proportioning of combined footings. **(06 Marks)**
   c. Design a friction pile group to carry a load of 3000 kN including the weight of pile cap at a site where the soil is uniform clay to a depth of 20 m underlain by rock. Average unconfined compressive strength of clay is 70 kN/m^2. With liquid limit 60%. A factor of safety of 3 is required against shear failure. **(08 Marks)**

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